Space Weather Forecast

Issued on Wednesday 2 October 2024 at 01:15 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Blackouts expected, chance of further R3 Blackouts. Chance of G1/Minor Geomagnetic storms days 1 and 2.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been High with a Strong flare and three Moderate class flares in the past 24 hours. Eleven sunspot regions cover the visible disc. The most notable is the largest sunspot group in the southeast, this has shown recent magnetic complexification, and is the source of the aforementioned strong flare. The next largest region is a new spot rotating into view around the northeast limb, the size has been modestly estimated, but is likely to unveil a larger and more complex structure in time than is currently visible. A spot in the northeast, close to centre disk is the next largest spot, with recent growth in areal extent. Two moderately sized and complex spots reside in the southwest, with growth observed within both spots recently. All other spots are smaller and appear relatively benign.

Two coronal mass ejections observed leaving the Sun 29/0612UTC and 30/1545UTC may give glancing blows over the next two days, but confidence in detail is very low. Although the spot which crated the Strong flare does not have a history of emitting coronal mass ejections during flares, as the most recent flare was a magnitude stronger than the previous largest flare, we await further imagery to see any evidence of a coronal mass ejection, should there be one, it is in a good position to have an Earth-directed component.

Solar Wind / Geomagnetic Activity: Solar wind parameters were indicative of a weakening coronal hole fast wind. Speeds were slightly elevated through the period though they have eased. Interplanetary Magnetic Field remained at weak levels. The north-south component remained at weak values. Geomagnetic activity was at Quiet (Kp 1-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles remained at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to become Moderate, with further Moderate class flares expected and a chance of returning to High should another isolated Strong flare occur.

Solar Wind / Geomagnetic Activity: A coronal mass ejection from 29 Sep may have glancing impacts at Earth until early day 1 (02 Oct). A coronal mass ejection from 30 Sep may give a glancing

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blow either on day 1 or day 2 (02 or 03 Oct). Solar wind speeds have been at slightly elevated levels through the period. Solar wind speeds should trend back to background in the next couple of days.

Quiet (Kp 0-2) geomagnetic conditions are expected to prevail through the next four days. There is a chance of Active (Kp4) periods or G1/Minor geomagnetic storms (Kp5) occurring day 1 or day 2 (02 or 03 Oct) due to a possible late glancing blow of the 29 Sep coronal mass ejection or the glancing blow of 30 Sep coronal mass ejection, this risk reducing later day 2 (03 Oct).

Energetic Particles / Solar Radiation: The count rate of energetic particles is forecast to persist at background levels, with a chance of rising above early in the period after the recent Strong flare.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	30	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	80	80	70	70
Very Active	R3-R5 (X Class)	Yes	30	30	20	20

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	30	20	20	20
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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